CLAIMS

What is claimed is:

1. A brace apparatus having an effective length capable of undergoing plastic deformation that is greater than the length of the brace apparatus, the brace apparatus comprising:

a plurality of core members; and

a buckling restraining assembly enclosing the plurality of core members, the buckling restraining assembly comprising:

a support tube; and

a rigid layer.

2. The brace apparatus of claim 1, wherein the plurality of core members comprises a first core member and a second core member.

3. The brace apparatus of claim 1, wherein the plurality of core members comprises more than a two core members.

4. The brace apparatus of claim 2, wherein the first core member is coupled to one end of the buckling restraining assembly and the second core member is coupled to the other end of the buckling restraining assembly.

5. The brace apparatus of claim 2, wherein the first core member has a first deformable length and the second core member has a second deformable length, the effective deformable length of the brace apparatus comprising the sum of the effective deformable lengths of the first and second core members.

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6. The brace apparatus of claim 5, wherein the core member can undergo a greater number of tension and compression cycles than a brace apparatus having a single core member of the same length.

7. The brace apparatus of claim 5, wherein the core member can undergo a greater amount of deformation than a brace apparatus having a single core member of the same length.

8. The brace apparatus of claim 1, wherein one or more of the plurality of the core member has a variable width.

9. The brace apparatus of claim 8, wherein the variable width of the one or more core members controls deformation of the core member to prevent the premature restriction of the effective length of the core member.

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10. A brace apparatus comprising:

a first and second core member adapted to absorb seismic magnitude forces by undergoing plastic deformation, each of the first and second core member having a deformable region; and

a buckling restraining assembly having a first extremity and a second extremity, the buckling restraining assembly enclosing the first and second core members such that the first core member is coupled to the first extremity of the buckling restraining assembly and the second core member is coupled to the second extremity of the buckling restraining assembly, wherein the effective length of brace apparatus undergoing plastic deformation is the sum of the length of the deformable region of the first core member and the length of the deformable region of the second core member.

11. The brace apparatus of claim 8, wherein the buckling restraining assembly includes a plurality of bearing members.

12. The brace apparatus of claim 9, wherein the plurality of bearing members are positioned around the first and second core members.

13. The brace apparatus of claim 11, wherein a bearing member is positioned between the first and second core members.

14. The brace apparatus of claim 11, wherein a plurality of bearing members are positioned between the first and second core members.

15. The brace apparatus of claim 11, wherein the plurality of bearing members minimize the friction between the first core member, the second core member, and the buckling restraining assembly.

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16. The brace apparatus of claim 10, wherein a plurality of air gaps are positioned between the buckling restraining assembly and the first core member and the second core member.

17. The brace apparatus of claim 16, wherein an air gap is positioned between the first core member and the second core member.

18. The brace apparatus of claim 17, wherein a plurality of air gaps are positioned between the first core member and the second core member.

19. The brace apparatus of claim 12, wherein the air gaps minimize the friction between the first core member and the second core member.

20. The brace apparatus of claim 15, wherein a plurality of spacers are utilized in the manufacture of the brace to create the air gaps.

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21. A brace apparatus adapted to absorb seismic magnitude forces by undergoing plastic deformation while maintaining the structural integrity of the brace, the brace apparatus being capable of undergoing a greater amount of deformation for a given length of the brace apparatus comprising:

a first core member having a first end, a second end, and a deformable region, the first core member being adapted to absorb seismic energy by undergoing plastic deformation, the first core member having a given deformation capacity;

a second core member having a first end, a second end, and a deformable region, the second core member being adapted to absorb seismic energy by undergoing plastic deformation, the second core member having a given deformation capacity;

a buckling restraining assembly circumscribing the first and second core members, the buckling restraining assembly comprising;

a support tube having a first end and a second end; and

a rigid layer coupled to the support tube, wherein the second end of the first core member is coupled to one end of the buckling restraining assembly and the second end of the second core member is coupled to one end of the buckling restraining assembly such that the total deformation capacity of the brace apparatus is the sum of the deformation capacity of the first core member and the deformation capacity of the second core member.

22. The brace apparatus of claim 21, wherein the support tube is comprised of a plurality of plate members that are welded together.

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23. The brace apparatus of claim 21, wherein the second end of the first core member is welded to the first end of the support tube and the second end of the second core member is welded to the second end of the support tube.

24. The brace apparatus of claim 21, wherein the second end of the first core member is coupled to the rigid layer at the first end of the brace apparatus and the second end of the second core member is coupled to the rigid layer at the second end of the brace apparatus.

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25. A brace apparatus comprising:

a buckling restraining assembly comprising;

a support tube; and

a rigid layer coupled to the support tube; and

a first core member positioned internal to the buckling restraining assembly, the first core member being coupled to a first extremity of the buckling restraining assembly, wherein the first core member is adapted to absorb seismic magnitude forces by undergoing plastic deformation;

a second core member positioned internal to the buckling restraining assembly, the second core member being coupled to a second extremity of the buckling restraining assembly, wherein the second core member is adapted to absorb seismic magnitude forces by undergoing plastic deformation such that the effective length of brace apparatus undergoing plastic deformation is the sum of the length first core member undergoing plastic deformation and the length of the second core member undergoing plastic deformation.

26. The brace apparatus of claim 25, wherein the effective length of the brace apparatus undergoing plastic deformation is greater than the length of the brace apparatus.

27. The brace apparatus of claim 26, wherein the brace apparatus experiences a smaller percent strain for a given amount of deformation than a single core brace having an effective length of the brace apparatus undergoing plastic deformation than is smaller than or equal to the length of the brace apparatus.

28. The brace apparatus of claim 26, wherein the brace apparatus is able to undergo a greater number of tension and elongation cycles for a given amount of

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deformation that a single core brace having an effective length of the brace apparatus undergoing plastic deformation than is smaller than or equal to the length of the brace apparatus.

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